

EXIT PRESENTATION

MASS AND RELIABILITY SOURCE DATABASE

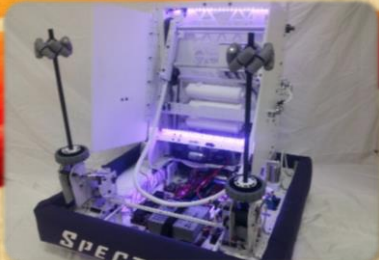
NC4

Ryan Ogilvie
Karl Rothe





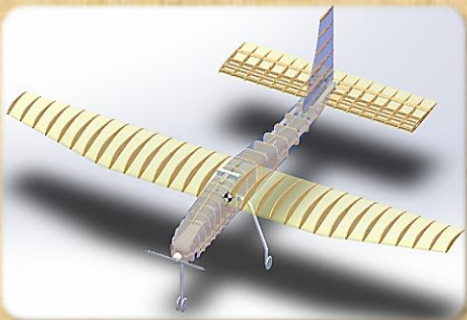
HAS ALUMNI



FIRST Robotics ALUMNI



PCB Design



Plane Design



Quadcopter Design



THE UNIVERSITY of
TULSA
Mechanical Engineering



Alpha
Phi
Omega



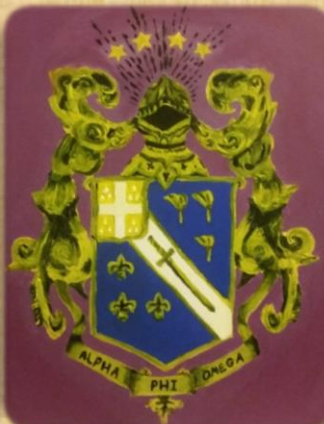
Tulsa SAE aero Team (Plane from Design)



Last Summer Internship (Daltille)



Painting



Family + Outdoors



WW2 Plane Restoration – Tulsa CAF



Bible Study with Astronaut David Leestma

RYAN OGILVIE - JSC EXPERIENCE



Astronaut Timothy "TJ" Creamer



Astronaut Douglas "Wheels" Wheelock



NBL movie night



Astronaut Clayton Anderson



Floor tour of MCC



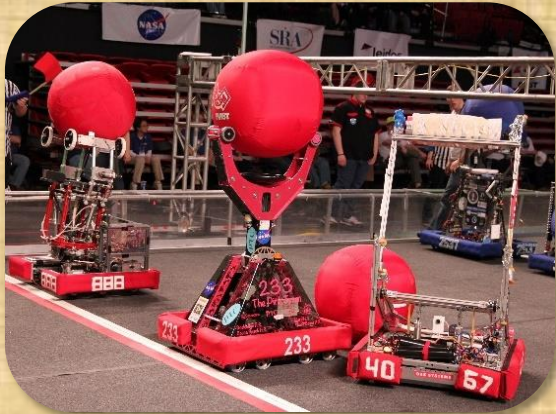
Galveston at Dawn



Flight Director Gene Kranz



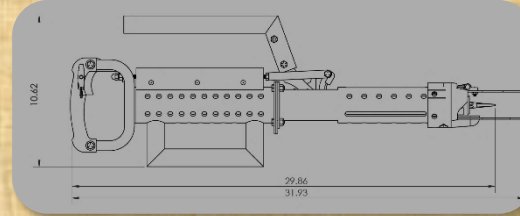
KARL ROTHE – ABOUT ME



FIRST Robotics Alumni



Marching Band



Micro-G NExT



Formula SAE



My cat



Robotics Lab



Girlfriend



1st Internship

KARL ROTHE – JSC EXPERIENCE



PAXC trip to Wallops



Grand Theft MRV



My robot friend



Astronaut
Clayton Anderson



Flight Director
Gene Kranz



Sounding Rocket
Launch Pad



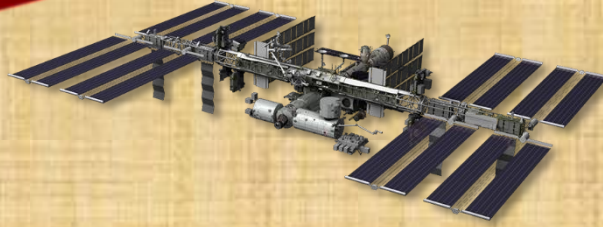
JWST



SAIL Lab

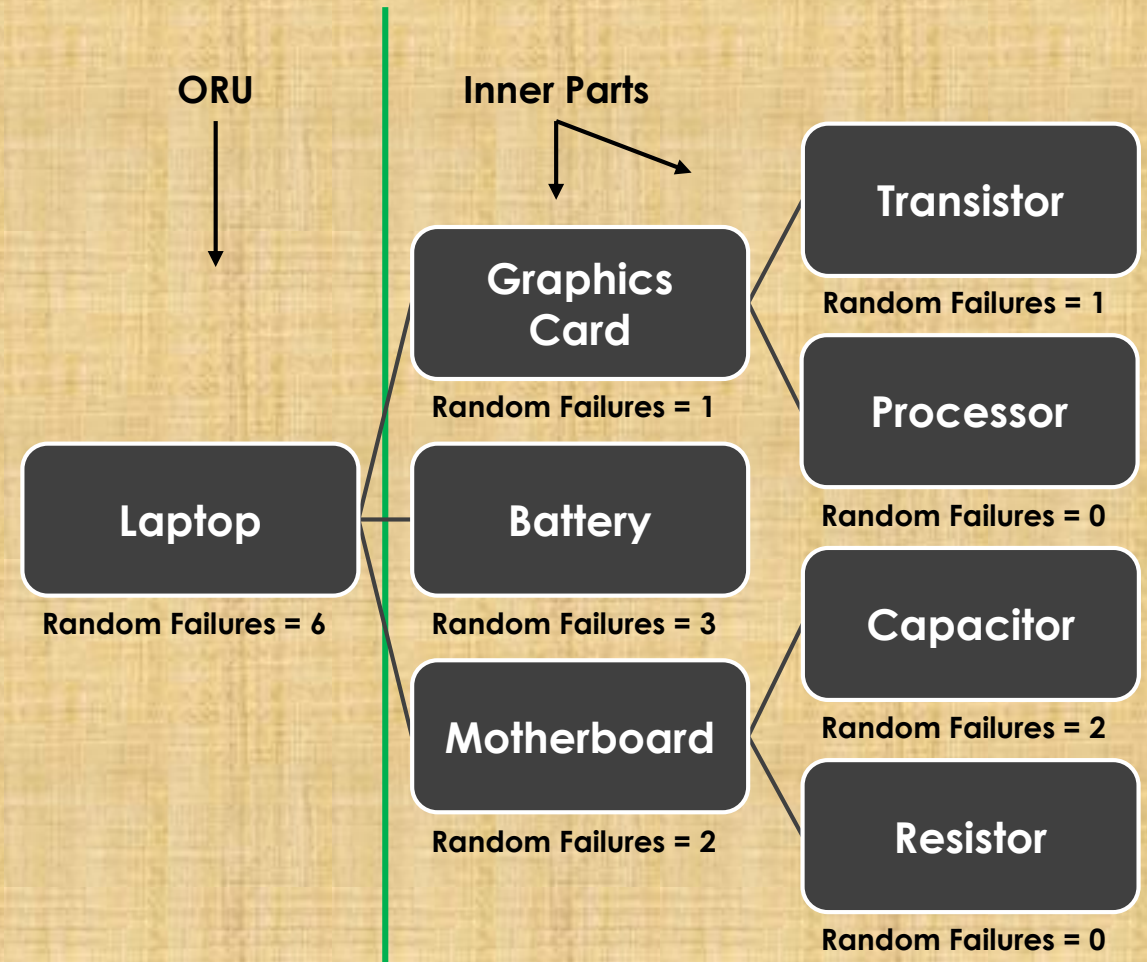


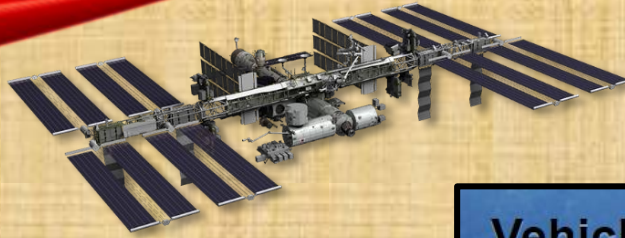
Anechoic Chamber



DATABASE OVERVIEW

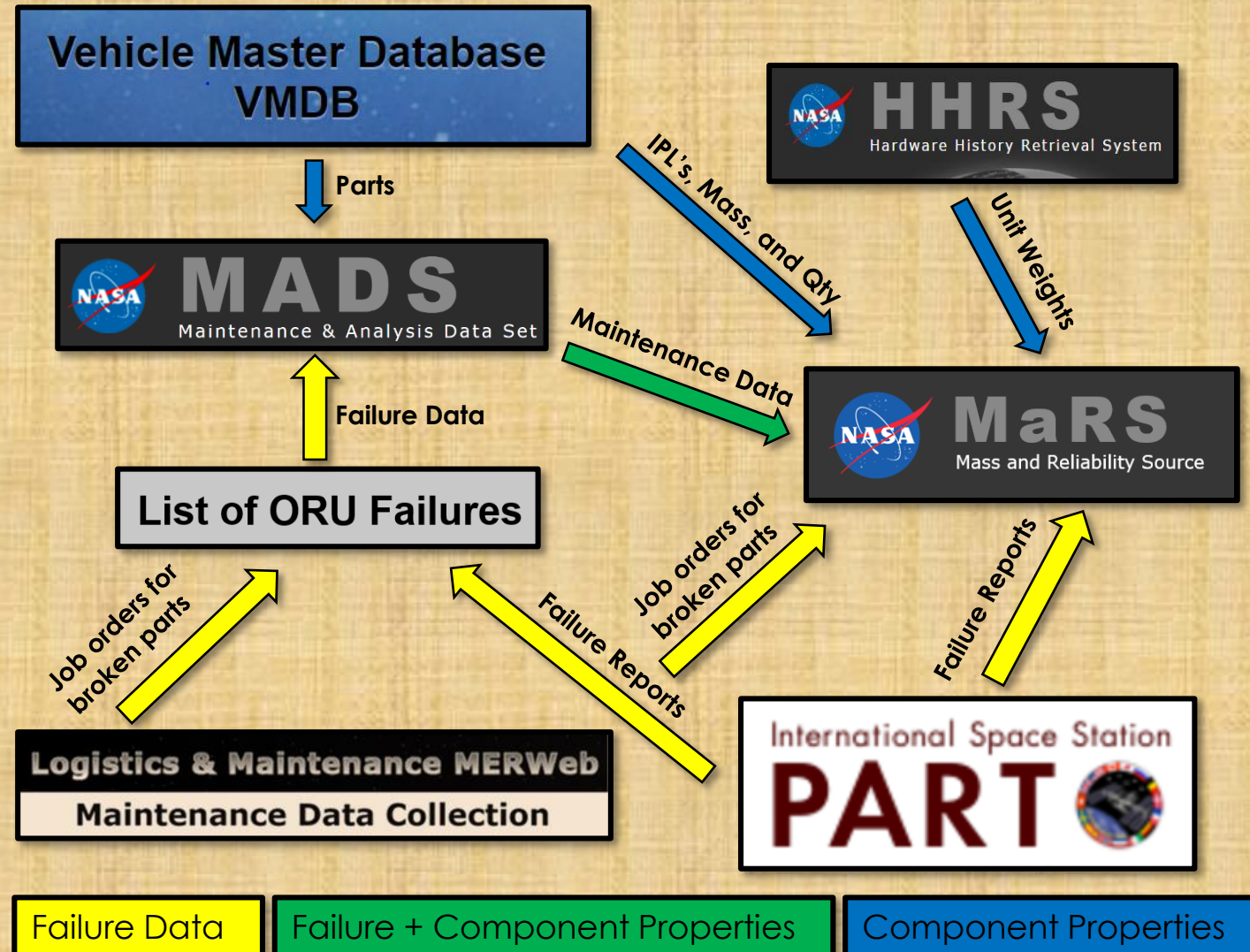
- MaRS: database of components on ISS
- Purpose: Planning of spare parts for deep space missions
- Contains: MADS ORUs with parts list, mass, and reliability data





DATABASE OVERVIEW

- MaRS is based on MADS
- Other databases add component and failure Information
- New Databases found
 - “List of ORU Failures”
 - “Maintenance Data Collection”



NEW DATABASE FAILURE LIST

- PowerPoint references to PART records and Job Orders
- This was compiled into one dataset of referenced Reports and Job Orders

L&M Failures: Random Failures – 1				
ORU	Fail Date	Failure Type	Job Order	PART
Powered Bolt Assy	04/20/2014	Unknown	ISS14-1233	8872
L&M Failures: K-Factor Failures – 5				
ORU	Fail Date	Failure Type	Job Order	PART
Panel Assy Fastener	03/27/2001	K-Factor	ISS01-0708	5671
Control Panel Assy (CPA)	02/13/2001	K-Factor	ISS01-0013	5653
Integrated Hose Assy	12/21/2003	K-Factor (ECLSS)	ISS04-0207	6567
Scratch Pane	01/31/2006	K-Factor	ISS06-0181	6443
Hatch Seal Assy	04/17/2008	K-Factor	ISS08-1109	2801
L&M Failures: Other Failures – 6				
ORU	Fail Date	Failure Type	Job Order	PART
Hatch Roller Assy	12/12/1998	Design Flaw	ISS01-0138	4047
Hatch Track	12/12/1998	Design Flaw	ISS01-0139	4047
Hatch Seal Assy	05/30/2005	Other	ISS05-1519	6450
Powered Bolt Assy	09/02/2009	Manufacturing Defect	ISS09-2096	7218
Hatch Seal Assy	12/14/2009	Other	ISS09-3081	N/A
Hatch Seal Assy	08/30/2010	Other	ISS10-2447	7623

Note: Updates since last Failure History Review are highlighted in blue.



List of ORU Failures

Logistics & Maintenance MERWeb
Maintenance Data Collection



Compilation of source(s)				Job Order				IFI		PRACA		Original failure analysis for MADS										Bayesian analysis PPT (MADS SOURCE)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
ORU Part Number	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job 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Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order	Job Order</

Failure analysis compilation sheet in the MaRS database

REDEFINING THE DATABASE

1. Merged “Metadata” sheet into components list
2. Added Columns:
 - Location, System, MADS ID, Checked, Weight Source
 - Metadata: Material & Tier 1;2;3;4
3. Removed:
 - Unnecessary columns
 - Broken Macros
 - Unnecessary colors

Removed Macros

Removed Columns

Index	Address	Part Number	Part Name	Data In VMDB?	Weight Approval	Data In MADS	Operating Hours	Random Failures	Random Software Failures	Unit Weight (lbm)	ORU	Quantity	Unique Parts in Assembly
1	1	683-61592-3	ACTUATOR ASSEMBLY				144335.95	0	0	3.700	Y	1	48
2	1.1	683-61593-1	PIVOT ARM ASSEMBLY				144335.95	0	0	0.169	N	1	3
3	1.1.1	683-61593-13	PIVOT ARM				144335.95	0	0	0.169	N	1	
4	1.1.2	MS21209C0210	INSERT, SCREW THREAD, COARSE AND FINE, SCREW LOC				144335.95	0	0	0.000	N	4	
5	1.1.3	MS21209C0410	INSERT, SCREW THREAD, COARSE AND FINE, SCREW LOC				144335.95	0	0	0.000	N	6	
6	1.2	683-61593-10	THERMAL SPACER, SHIM				144335.95	0	0	0.002	N	1	
7	1.3	683-61593-11	THERMAL SPACER, BUSHING				144335.95	0	0	0.000	N	2	
8	1.4	683-61593-12	STOP, OVER TRAVEL				144335.95	0	0	0.008	N	2	
9	1.5	683-61593-17	THERMAL SPACER, LIGHT EMITTING DIODE				144335.95	0	0	0.000	N	1	

Old MaRS

Added Columns

Index	Address	Part Number	Part Name	MADS ID	Location	System	Operating Hours	Random Failures	Software Failures (Random)	Unit Weight (lbm)	Weight Source	Quantity	Material	Tier1	Tier2	Tier3	Tier4	Checked
361	5	683-61599-5	PUSHROD, ASSEMBLY	21081	5:LAi	ARIS	81375	0	0	0.15	VMDB	2						Verified
362	5.1	683-61591-1	ROD		5:LAi	ARIS	81375	0	0			1						Verified
363	5.2	683-61591-10	GUARD		5:LAi	ARIS	81375	0	0			1						Verified
364	5.3	683-61591-11	GUARD COVER		5:LAi	ARIS	81375	0	0			1						Verified
365	5.4	683-61591-13	MUSIC WIRE		5:LAi	ARIS	81375	0	0			1						Verified
366	5.5	683-61591-14	MUSIC WIRE		5:LAi	ARIS	81375	0	0			1						Verified
367	5.6	683-61591-5	WIRE FLEXURE COUPLING		5:LAi	ARIS	81375	0	0			1						Verified
368	5.7	683-61591-6	WIRE FLEXURE COUPLING		5:LAi	ARIS	81375	0	0			1						Verified
369	5.8	683-61591-7	FLEX COUPLING ATTACHMENT - ACTUATOR		5:LAi	ARIS	81375	0	0			1						Verified

New MaRS

UPDATES AND VERIFICATION

- Verified components in MaRS with MADS and their IPLs
- Added 400+ missing MADS ORU's with their IPLs
 - 40,000 new lines for a total of 120,000 lines
- Checked IPLs vs. newly downloaded IPLs for 800+ parts

tier 4	Checked
Verified with Name Mismatch	
Verified with Name Mismatch	
Verified with Name Mismatch	
not in mads	
not in mads	
Possibly Missing IPL	
Verified with Name Mismatch	
not in mads	
Possibly Missing IPL	
Possibly Missing IPL	
Verified with Name Mismatch	
Verified with Name Mismatch	
Verified with Name Mismatch	
Verified with Name Mismatch	
Verified with Name Mismatch	
Verified with Name Mismatch	

Errors we found

DOWNLOADING IPLS

- Manually
 - 20 mouse and keyboard inputs
 - 3-7 minutes each
- Macro Assistance
 - 8 mouse inputs
 - 1-2 minutes each

The screenshot displays the Vehicle Master Database (VMD) interface. A central window titled 'Report Completed' shows a message: 'Report sent to your spreadsheet application.' Below this, a table lists parts for assembly 683-61592-3. The table has columns for Part Number, Description, and Quantity. The parts listed include:

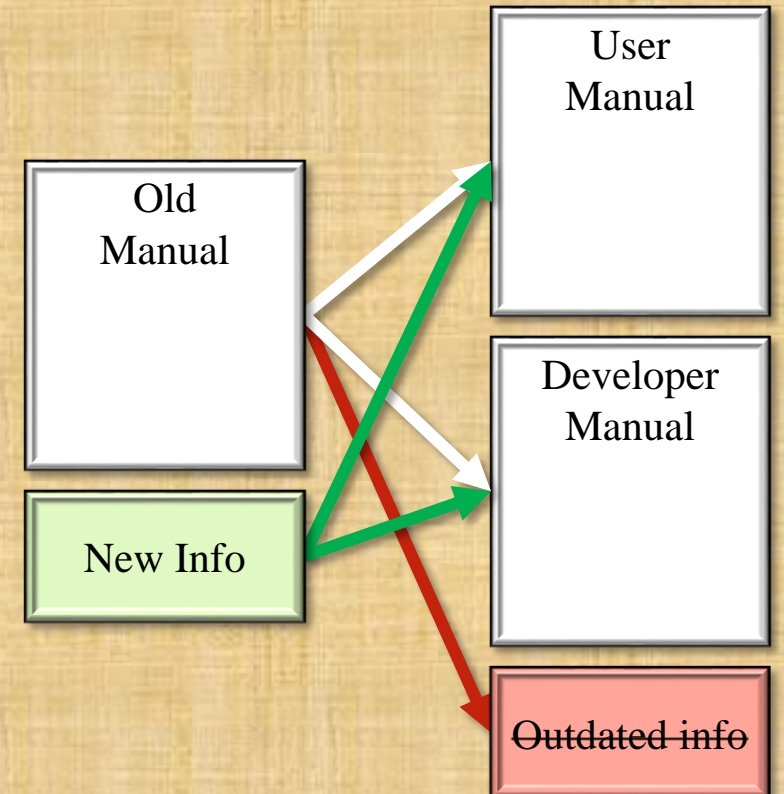
Part Number	Description	Quantity
683-61592-3	SUPPORT FLEXURE ASSEMBLY	1
683-61592-1	BRACKET, LIGHT EMITTING DIODE	1
683-61592-10	CLAMP FLEXURE	4
683-61592-11	FLEXURE	2
683-61592-12	CLAMP WIRE	5
683-61592-17	NAME PLATE	1
683-61592-2	PWB ASSY - DETECTOR POSITION SENSOR	1
683-61592-3	PWB ASSY - LED, POSITION SENSOR	1
683-61592-4	WIRING ASSEMBLY, ACTUATOR	1
683-61592-5	WIRING ASSEMBLY, ACTUATOR	1
683-61592-6	LENS ASSEMBLY	1
683-61592-7	BRACKET ASSEMBLY	1
683-61592-8	ENCLOSURE ASSEMBLY	1

The interface also includes a search bar, a 'Part Details' window, and a 'Part Locations' window. The 'Part Locations' window shows a table of locations for the selected part, with columns for Flight, Phase, Top Level, and SubLevel. The locations listed include:

Flight	Phase	Top Level	SubLevel
8A	ON-ORBIT	D684-106	7A.1 AND ON
2S	ON-ORBIT	D684-106	7A.1 AND ON
4P	ON-ORBIT	D684-106	7A.1 AND ON
7A	ON-ORBIT	D684-106	7A.1 AND ON

DOCUMENTATION UPDATE

- Removed outdated information
- Quick reference tables
- Glossary of terms
- End-user edition and developer edition



CONCLUSION - KARL

- Impact of Internship
 - Structure of NASA
 - Communication and teamwork skills
 - Confirmed desire for a career in aerospace
- Future Plans
 - Apply to Pathways
 - Electrical Engineering Degree
 - Move to JSC area
 - Seeking career in aerospace

CONCLUSION - RYAN

- Impact of Internship
 - Understanding of failure analysis
 - Probability and risk analysis
 - NASA's missions and goals
 - Communication in teams
 - Furthered my interest in working for NASA
- Future Plans
 - Mechanical Engineering Degree (May 2018)
 - Masters in Mechanical or Aerospace Engineering (Fall 2018)
 - Apply to NASA as Pathways or internship
 - Pursue a job in space industry

ACKNOWLEDGEMENTS

- Mentor: Roger Boyer
- Co-Mentor: Mark Valentine
- Internship Coordinators: Melissa Corning, Courtney Barringer, Holly Middaugh
- Van Keeping, Nicholas Meyer
- Jessica Mclaughlin
- NA Directorate
- NC Division

QUESTIONS?

2017 Summer Intern Award Ceremony

Come see how interns at Johnson Space Center have impacted NASA's mission! Everyone is welcome!

Date: Wednesday, August 9
Time: 3:00pm – 4:00pm (CT)
Location: Teague Auditorium

Following the event, be sure to stay for refreshments in the Teague Lobby from 4:00pm – 4:30pm.

